NITROGEN, NEON AND ARGON IN THE PCA91467, AN ALH85085-LIKE CHONDRITE;
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PCA91467 is one of the ALH85085-like chondrites recovered recently from Antarctica. ALH85085 and the members of this chondrite group thus far studied are characterized by isotopically heavy nitrogen [1,2] and seem to be related to CR chondrites. Oxygen isotopic compositions are also related to CR chondrites [3]. We measured nitrogen, neon and argon isotopic compositions of PCA91467. The purposes of the study are 1) rare gas concentrations may be useful for establishing pairing with the other Antarctic chondrites, 2) abundances and isotopic compositions of nitrogen and argon may reveal intra-group variation of this group and 3) simultaneous study of nitrogen and rare gases may reveal information on the carrier of the anomalous nitrogen. Gases were extracted by a stepped combustion method from 200°C to 1200°C. The measurements were made with a static QMS. Details on the experimental procedures have been reported elsewhere [4]. The results are summarized and compared with two other chondrites in the group in Table 1.

Generally speaking, PCA91467, ALH85085 and Acfer182 are quite similar to each other. Abundant isotopically heavy nitrogen is observed in PCA91467 (Fig.1). The main release of nitrogen occurred at 400°C. The maximum of delta 15N value is somewhat smaller than those (1500 permil) observed for ALH85085 [1] and Acfer182 [2], but it may be simply due to larger temperature steps in the present study. The profile of delta 15N release pattern, one peak at 600°C and another peak at 1000°C, is also similar to the other two chondrites [1,2]. Trapped 36Ar is quite abundant. The release peak of 36Ar is at 1000°C which coincides with the peak of delta 15N profile, suggesting presolar origin of the carrier.

Cosmogenic rare gases in PCA91467 are not abundant, similar to ALH85085 [5]. Assuming chemical compositions and shielding conditions are similar to ALH85085, a cosmic ray exposure age of about 2 m.y. is obtained. Solar neon was observed both in ALH85085 [5] and Acfer182 [6], but it is not present in the PCA91467 (Fig.2). Planetary neon (carried by diamond) is present in PCA91467 and ALH85085 [5]. The abundance of 40Ar is, again quite similar for the three chondrites [5,6].

In conclusion, PCA91467, ALH85085 and Acfer182 are quite similar to each other with respect to the abundances of trapped noble gases and radiogenic 40Ar. The abundance, isotopic composition and the release profile of nitrogen are also quite

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similar for these chondrites. But, Acfer182 has a longer exposure age compared with the other two, and solar rare gases which are present both in ALH85085 and Acfer182 are not observed in PCA91467. Therefore, these chondrites can not be paired with each other.


Table 1. Comparison of PCA91467, ALH85085 and Acfer182.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Nitrogen (ppm)</th>
<th>Max. 15N (%)</th>
<th>Excess 15N (ppb)</th>
<th>Cosmo. 21Ne</th>
<th>Trapped 40Ar</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA91467</td>
<td>400.5</td>
<td>1077</td>
<td>1174</td>
<td>0.74</td>
<td>39.8</td>
</tr>
<tr>
<td>ALH85085</td>
<td>280</td>
<td>1497</td>
<td>189</td>
<td>0.52</td>
<td>48.5</td>
</tr>
<tr>
<td>Acfer182</td>
<td>85.4</td>
<td>1583.9</td>
<td>190.3</td>
<td>3.46</td>
<td>27.7</td>
</tr>
</tbody>
</table>

*:average of two measurements.

Rare gas abundances are in the unit of 10^-8 ccstplg.

Fig. 1

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